REMARKS ON LITHOTRITY.

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WHAT is Lithotrity? Upon the answer returned this question will depend the estimate you form of this procedure as a surgical measure, and the value you accord certain proposed modifications of lithotrity as an operation for the cure of stone in the human bladder. Etymologically, lithotrity signifies a process of stone-crushing; as a technical term of surgery it denotes a procedure by which an instrument is passed along the urethra and into the bladder, and made to grasp and crush a calculus — the resulting debris being evacuated through the natural passages without recourse being had at any time to the knife. Such are the essential of lithotrity; in its details the surgeon has great diversity of choice. In one individual in whom the stone is neither very large, nor very hard; a single sitting may suffice for the reduction of the calculus to fragments so minute that they may be discharged spontaneously; again, the development of symptoms indicative of local irritation may cause the operator to re-introduce the lithotrite, and completely granulate all the remaining fragments in a case in which he originally intended to prolong the crushing through a number of sittings; in an other patient the lithotritist may see proper, not only to reduce the calculus to small particles at one sitting, but he may pass an evacuating tube and remove all the fragments. Nevertheless, the general rule in this operation is to perform the maximum of work with the minimum of disturbance; to destroy as much of the stone as possible whenever the lithotrite is employed, but to avoid disturbing the bladder, or irritating the system. In the majority of the cases which should fall to the lithotritist it is possible for the surgeon to so prepare his patient that the stone can be gradually reduced to fragments—treatment being prolonged over a number of sittings, but great care being exercised to prevent vesical disturbance or systemic irritation — and these fragments discharged from the vesical

cavity without the introduction of evacuating tubes or the employment of an aspirator.

Too much attention cannot be paid to the instruments with which the stone is crushed by those who desire to familiarize themselves with lithotrity. Every point relating to the size, shape, construction, material, weight, form and mechanism of a modern lithotrite has only been determined — as Thompson well expresses it — by careful attention to the necessities of hundreds of cases, and through long years of experience, and after the occurrence of numerous contingencies not anticipated at first, but now provided for. The parts common to all modern instruments are beak, staff and handle; the former consisting of two blades or jaws—the "male" and "female" blades, parts, also sometimes denominated the "shoe" and "foot"; the staff comprising shaft and sliding rod; and the handle containing the screw and mechanism for throwing it into, and out of gear, and surmounted by a wheel. The beak is the curved terminal (distal) extremity; the handle, the proximal enlarged end of the instrument; between the two is the staff, the longest section of the appliance. The staff is straight, about four inches longer than the urethra; it consists of two portions, the shaft, continuous with the female blade, or shoe, and the sliding rod, continuous with the male blade, or foot. If we follow the female blade to the shaft, and thence pass along the excavation in the shaft designed to shelter the sliding rod to the proximal extremity of the lithotrite, we come upon the handle proper, which, in the most desirable form of the modern instrument is cylindrical in form. When the lithotrite is closed, the blades being in coaplation, the screw is within the handle and the wheel in immediate contact with the end of the latter. If, in like manner, we pass from the male blade to the wheel, we come first upon the sliding rod, then upon the screw, and last of all, reach the wheel. The male blade, the sliding rod, screw and wheel form one continuous whole, that can be readily removed from the remainder of the instrument. If the handle be grasped in the surgeon's left hand, he can cause the blades of the beak to open and close by moving the wheel backwards and forwards with his right hand. If, furthermore, the blades be made to grasp any object the size and shape of a vesical calculus, the surgeon, by touching a button on the handle, can exchange the compressive force of his hands for the mechanical power of the screw. This button acts on a spring which throws into gear the threads of the screw, and now, by turning the wheel, the screw is made to revolve, and the object between the blades is subjected to an almost irresistible compressive force. A moment's glance at an instrument of this kin,d and a little study of its mechanism, will speedily familiarize the student with its office and the proper method of handling it.

The instrument I now bring before you—which you will observe is

simply a large rubber bulb with a glass tube or "cage" at its inferior extremity and a rubber pipe which connects its upper part with an urethral canula—is designed to aid in the evacuation of calculous fragments from the bladder. We are indebted to Professor Bigelow, of Boston, for the present improved form of this instrument. The original Clover apparatus was by no means so convenient as this one; the urethral canulæ were too small, and the glass cage was not so advantageously situated.

In what class of cases should we resort to lithotrity? A moment's reflection will convince any one who has examined the instruments with which the stone is destroyed that it is not every patient with vesical calculus who can be cured by the crushing process. A patient to be relieved by lithotrity must possess an urethra sufficiently capacious to permit the introduction of an instrument designed to crush the stone. Not only must the urethra be sufficiently large to admit a lithotrite, but it must not be so sensitive as to prevent the retention of this instrument within the urinary passages for a few moments at a time. Again, the stone itself must neither be too hard nor too large to be crushed with safety. Multiple calculi, if the aggregate bulk of calculous material be very great, contra-indicate lithotrity. Furthermore, the patient must be one in whom it would be reasonably safe to perform a capital operation; he must be free from circulatory and respiratory affections, and above all, have no organic affection of the kidneys. In such patients as can permit the surgeon to introduce a lithotrite readily and bear its presence for a few moments at a time; in whom the stone is neither too large nor too hard to yield to the screw power of a modern instrument; and in whom there is nothing to prevent the performance of a capital operation. Lithotrity is the proper measure for their relief, it matters not the age nor the sex of the patient. In certain individuals these essential conditions may be brought about as the result of treatment. Thus, occasionally the surgeon discovers such a degree of contraction of the external meatus of the urethra as prevents the introduction of the lithotrite. A small bistoury, a tenotome, or a Civeales' urethrotome may at once be made to remove the trouble. In numerous other cases the urethra is so very sensitive that reflex contraction literally prevents the insertion of a lithotrite. Here preliminary treatment calculated to overcome hyperæsthesia of the urethra is urgently demanded. In brief, preliminary treatment may not only increase the size of the urethral canal in certain cases, but it very generally results in such a reduction of the tendency to reflex contraction characteristic of the urethral muscular structure that the surgeon finally succeeds in effecting an easy and satisfactory introduction of his instruments in cases that at first seemed utterly beyond control.

The necessities of the occasion not only compel me to be concise, but make me omit many points I should like to dwell upon. Thus I

should like to say more about the advantages of preparatory treatment; and the necessity of making constant thermometric observations not only during, but before the crushing procedure is initiated. However, as my time is limited I prefer to devote attention to the details of the operation. A thorough acquaintance with the patient's temperature and his reaction to morphia are essential to Lithotrity as I conceive the operation should be performed. A record should be made of the patient's temperature as determined by the insertion of a thermometer into his rectum every six hours; his reaction to morphia should likewise be recorded. These facts noted, the stone is then to be measured and the operation commenced.

The position of the patient is very important in every instance in which a lithotrite is introduced. If the bed be too low, the operator must assume a cramped and confined position; if too high, the surgeon will become fatigued before his work is done. What rule can be adopted applicable to all cases? The following is a good one: let the pelvis of the patient be so elevated that when the operator advances to insert the crushing instrument — the latter held in his left hand, his left forearm being at a right angle with his body—his left hand will just pass over the lower part of the patient's abdomen. Furthermore, when the surgeon stands facing the patient's pelvis, the latter should rest upon an inclined plane, with his hips higher than his shoulders, his heels higher than his hips, his knees slightly separated, supported upon pillows, and elevated a little above the level of his feet. The surgeon can then stand erect and at ease by the right side of his patient, and work to advantage, while the latter is in the best possible position for the stone to be readily grasped by the lithotrite when introduced. Grasping the lithotrite near the handle at the point at which it "balances" readily in his hand, and holding it in a line parallel with the patient's body, the surgeon with his right hand takes hold of the patient's penis, opens the lips of the urethra and cautiously and gently introduces the extremity of the beak into the mouth of the urethra. This done, with the fingers of his right hand he slowly slips the urethra forward and upwards until the beak and part of the staff of the lithotrite are ensheathed by the urethral tube. As this process approaches completion the beak is somewhat depressed and the handle a trifle elevated; the instrument no longer remaining on a line with the patient's body, but forming an angle with it which gradually increases the further it is introduced. This process is kept up until the surgeon is aware that the point of the lithotrite is near the triangular ligament—until the handle of the instrument approaches a right angle with the patient's body. Even in a healthy person the lithotrite would have to be cautiously manipulated at this point, for not only does the firm contraction of the compressor urethræ interpose an obstacle to the further entrance of the instrument, but the lax tissues of the bulbous portion of the urethra readily allow the

point of the beak to impinge upon the triangular ligament below the urethral opening. Should the surgeon think the beak in the membranous urethra and in consequence depress the handle too soon, he would run a great risk of rupturing the urethra. I am afraid the danger of overlooking this point, has not been sufficiently dwelt upon. Please remember that the surgeon can not be too careful in assuring himself that his instrument has passed through the opening in the triangular ligament before he permits the handle to depart from a right line with the patient's body. One good method of obviating danger here, is, when the beak is near the terminal portion of the spongy urethra, for the surgeon to elongate the urethral tube by grasping the head of the penis and pulling it up on the staff at the same time, that he cautiously elevates the point of the beak so as to make it impinge upon the orifice of the contracted membranous urethra. If he resorts to this maneuver and holds the point of the beak in contact with the opening in the triangular ligament he will soon be rewarded for his care and caution by feeling the compressor urethræ relax and the beak of the lithotrite engage in the membranous urethra. So soon as the beak passes into the opening in the triangular ligament the handle of the lithotrite assumes a vertical position; at the same time the operator is conscious that the beak is firmly embraced by the surrounding structures. Yet, firmly as it seems to be held, if the surgeon but waits a moment, the grasp relaxes and the point can be made to advance a step farther on its journey to the bladder. There are three points at which the lithotritist must be prepared to overcome obstacles in introducing a lithotrite. One point is at the external meatus of the urethra, the second, at the membranous urethra and the third, at the posterior part of the prostate—at the internal meatus of the urethra. At the external meatus the most difficult problem can always be solved by a trifling incision — for the small size of the orifice is generally what has to be overcome at this point. At the anterior layer of the triangular ligament the canal is always large enough; the difficulty consists in making the point of the lithotrite touch, and for a few moments remain in contact with the contracted membranous urethra. The surgeon must remember that the beak is to be carried along the roof of the bulbous portion of the spongy urethra, if this end is to be attained; that the danger to be avoided consists in the point of the beak striking the triangular ligament below the urethral opening in that structure. A knowledge of anatomy and intelligent practice alone can make the operator master of this seemingly trifling, but in reality, very important practical maneuver. Even after the beak of the lithotrite has passed through the membranous urethra, the bladder has not been reached. If the surgeon were introducing the lithotrite into an individual free from stone, — much more so in case the patient had calculous disease—it would be desirable, after the beak has

passed the opening in the triangular ligament, and been grasped by the compressor urethræ muscle, to wait a few moments for relaxation to ensue before endeavoring to pass the instrument into or through the prostatic urethra. As soon as the muscular tissue relaxes, the instrument will feel free—the surgeon should then permit it to advance by much less even than its own weight. If grasped after passing the opening in the triangular ligament, it will do no more than enter the prostatic urethra at the first relaxation — at this point even in an individual free from calculous disease it will now be held firmly and immovably for several minutes. The surgeon should content himself with simply holding the instrument so that not more than one fourth of its weight is borne by the patient's urinary passages, and patiently wait the next interval of relaxation. As just indicated, several moments may pass — when the beak is in the prostatic urethra — before the internal meatus of the urethra will open and the point of the instrument enter the bladder. In one in whom there is no vesical disease not only the point, but the whole of the beak, may pass into the vesical cavity. In such cases, the operator not only knows the fact by the extent to which the instrument enters the body of the patient, but he is rendered certain by the freedom with which he can revolve the beak to the right or left — a movement impossible when the beak is in the prostatic urethra. Another indication of the presence of the beak in the bladder is the small angle formed by the lithotrite with the body of the patient. You may have noticed that I have said nothing to you about changing hands, or making pressure upon the base of the penis. Neither measure is necessary in introducing a lithotrite into the healthy bladder. In a patient with stone in whom reflex contractility of the muscular tissues of the urinary passages is greatly augmented, both measures may be required. In such a case the surgeon as he stands by the right side of and facing the pelvis of his patient finds so much opposition made to the entrance of the point of his lithotrite that mere fatigue may require him to change the hand with which he holds his instrument. However, even in such cases, relaxation alternates with contraction, and patience and gentleness enable him to introduce the beak of the lithotrite as far as the triangular ligament. As soon as the point passes along the membranous urethra and the handle of the lithotrite assumes a vertical position, the surgeon may change hands. Releasing his grasp from that portion of the staff near the handle of the lithorite at which the instrument readily "balances," he now supports the cylindrical handle with the thumb and first two fingers of his right hand. When the beak enters the prostatic urethra and the handle begins to descend, the unpleasant feeling of tension about the perineum can be relieved by the surgeon, making pressure with his left hand at the root of the penis. Finally, when he parts holding the lithotrite once more relax, a little pressure may be

required to carry the beak through the internal meatus. The manner in which the urinary passages have permitted the lithotrite to enter as far as the prostatic urethra must be the measure of the force exercised to carry the beak into the vesical cavity. If relaxation has speedily succeeded contraction and but little trouble has been experienced in introducing the lithotrite thus far, but little pressure will be required to carry its extremity into the bladder. On the other hand, if as in many cases of calculus, the relaxation has been but fleeting, and the contraction firm and long continuing, a considerable degree of pressure must be made finally in order to carry the beak into the vesical cavity. In these different and widely unlike cases there is but one unfailing instructor—and that is personal experience.

The cavity of the bladder gained, the manipulations executed will depend upon the object to be accomplished. Often you will be called upon to pass such an instrument for the purpose of exploring the vesical cavity for diagnostic purposes unconnected with calculous disease. Again, you may have to resort to the lithotrite in cases of foreign bodies in the bladder. But recently I was called upon to remove part of a hair-pin, inserted by a young lady of an investigating turn of mind, into the urethra and by the urethra grasped and carried into the vesical cavity. In other cases, calculi must be measured, their size determined and their number revealed. Finally you must pass this instrument for the purpose of grasping and crushing stone that has developed in the bladder. My remarks to-day must be limited to the latter.

Those of you who have given attention to the literature of the subject are aware that there are two widely different methods of destroying stone by means of the lithotrite. In one method the stone is made to come to and fall into the jaws of the crushing instrument. In the other, the instrument is made to seek for, find and grasp the stone without the latter executing any movement whatever. Each method has its partisans, but the latter seems the popular measure at the present time; in fact every lithotritist has a method more or less peculiar to himself, the growth and development of his own experience. In order that the operator may assure himself that nothing has been overlooked—no part of the bladder unexplored—something like the following course should be pursued:

So soon as the beak passes through the internal meatus of the urethra and is fairly within the vesical cavity, pass it gently and slowly backwards until it touches the posterior wall of the bladder. Should the stone have been touched in its journey, incline the beak a little to the opposite side from the stone and withdraw the male blade (by operating upon the wheel with the right hand while the left hand grasps the cylindrical handle) until its anterior surface is in gentle contact with

the lining membrane of the anterior wall of the bladder; then so revolve the side at which the stone is situated to an angle of forty-five degrees; and then slowly force the male blade home until its posterior surface is brought in contact with the stone—as soon as the male blade touches the stone, stop moving it, but draw the female blade forwards until the stone is grasped between them. Press the blades together with sufficient firmness to hold the stone between them; then so revolve the handle of the lithotrite that the stone passes along the semi-circumference of a circle—in this manner the presence or absence of a second calculus can be determined. The stone returned to its original position, without relaxing the grasp of the blades with which it is held, touch the button on the handle by which the screw movement is thrown into gear, and bring the blades under the control of the screw. You now have a firm hold upon the stone: a hold that can be augmented or diminished at will. Grasping the cylindrical handle of the lithotrite with your left hand, you hold the wheel in your right, and are ready at any moment, to subject the calculus to the crushing power of the screw. Revolve the handle so that the blades occupy the center of the vesical cavity; then, as you gradually turn the wheel you feel a constantly increasing resistance. By turning the wheel rapidly, for a few seconds, then stopping and for a moment slightly relaxing the grasp of the blades upon the calculus; then repeating the whole series of maneuvers again and again; you subject the stone to a peculiar sort of percussive force that is exceedingly effective in breaking even a large and hard stone. You will notice that I now exhibit two lithotrites alike in every essential respect save that in the one the floor of the female blade is excavated and the beak and staff slightly larger than in the other. The one is a "fenestrated," the other a "non-fenestrated" instrument. The fenestrated lithotrite is the largest and most powerful instrument made, and I think I am safe in saying that the surgeon can crush any stone which will rest between its blades when the screw movement is in gear; that once the stone is fairly caught, and by turning the instrument to and fro, he has assured himself of the safety of the bladder-walls, the operator can go ahead and crush—exercising any power he pleases upon the wheel until the calculus yields—feeling assured that the stone and not the instrument will be the one to give way. I need scarcely say that this is not the case with the non-fenestrated lithotrite. The latter is designed for fragments, and not for unbroken calculi; while the former is made to crush the stone originally and prepare fragments for the latter. Consequently, the maneuvers of an operator, after grasping a stone, will depend somewhat upon the size of the calculus, and the instrument used. If the stone is large, and his instrument a fenestrated lithotrite, he first assures himself of the safety of the bladder walls, and then seeks to determine so far as possible,

the nature and composition of the calculus he has caught. Having satisfied himself that there is but one stone, he slowly turns the screw and carefully attends the sensations he appreciates as the teeth of the instrument enter the outer layers. If the stone is of oxalate of lime, a very different sensation is communicated than is developed when the soft phosphates yield to the lithotrite; while a layer of the oxalates succeeding the urates can be readily distinguished from layers of the urates, deposited about an oxalate nucleus, or a coating of phosphates upon a central body of uric acid or the urates. A soft external coating about a hard central body should always be watched for. Whatever the phenomena developed, so soon as the stone yields, the male blade is to be worked home, the screw ungeared, the blades separated and an endeavor made to grasp a fragment just beneath where the stone was crushed. Open the blades as before, turn them to the same side to the same extent (an angle of forty-five degrees) and slowly close the male blade. Should the latter come in contact with a fragment, stop moving it, but draw forward the female blade so as to grasp whatever is between them; so soon as the fragment is caught, revolve the blades as already detailed to assure yourself of the safety of the vesical walls, bring the screw into gear and crush. Whenever a stone is caught, just after the screw movement is in gear, note on the scale at the handle the size of stone or fragment and have its dimensions at once recorded by an assistant. In the same manner have the result of every movement of a lithotrite within the bladder recorded by an assistant at the moment it is executed. This fragment crushed, repeat the maneuver and crush again. Finally, when no more fragments can be caught by inclining the lithotrite to an angle of forty-five degrees on the side the stone was caught originally, turn the lithotrite to the opposite side to the same point. Generally, several fragments of good size can be seized there. So soon as no more can be grasped, turn the lithotrite to the opposite side and depress it to an angle of ninety degrees, and grasp and crush as before. The operator may alternate from one side to the other, until all the large fragments are seized. With a non-fenestrated instrument, in certain cases, it may be advantageous for the operator to reverse his lithotrite, directing the blades directly downwards. This maneuver is accomplished by depressing the handle as the blades are revolved until the handle is on a line with, or even a little below the horizon, the well-opened blades are then directed vertically downwards, and if the handle be sufficiently depressed, their extremities will impinge but slightly upon the floor of the bladder. At this point I am in the habit of moving first one and then the other blade until one of them touches a piece of stone; then the other is moved up to it until the fragment is grasped; they are held in opposition and slowly revolved until it is clear none of the bladder wall is caught when they are restored to their proper situation

and the fragment crushed. Often, when the fragments seized are small, manual pressure suffices for their destruction.

Having succeeded in crushing your stone very thoroughly, how can you evacuate the fragments should you desire to do so? This aspirator and these urethral canulæ—the device of Professor Bigelow—will enable you to do so. The canula is introduced just as you would pass a straight catheter; so soon as it is in, connect its free extremity with the rubber tube of the aspirator, and, as the latter is filled with warm water, by pressing its yielding sides you can throw into the bladder from one to four ounces of water. As I now compress this aspirator, but two ounces would be forced through the canula and into the bladder; yet this quantity is amply sufficient to stir up and scatter about the entire mass of calculous matter. The evacuation of fragments, like everything else, is something to be learned by practice — still it is an art readily acquired. Direct the opening of the canula towards the fragments and force the water into the bladder; this separates and whirls away the pieces — then depress the canula into the floor, holding its mouth upwards and slowly permit the water to return by gradually letting the elastic walls of the aspirator expand: at once the fragments will collect in the glass tube at the bottom. Should the aspirator expand slowly, you can rest assured a fragment has been caught; the canula must be withdrawn and the fragment removed. You must remember this fact: although you may crush with safety when there is but very little urine in the bladder, yet, when you endeavor to evacuate the fragments, you must remove what urine there is when you pass the canula and at once introduce from three to six ounces of warm water before connecting the aspirator with the canula. This prevents the injury of the vesical walls by suction, and guards against the complete emptying of the bladder while the evacuating procedure is in operation.

How much work should be done at once, how long should a sitting be prolonged, and how many sittings are necessary for the removal of a calculus? These questions are hard to answer, for individual cases differ so widely. Certain principles are plain, however. You should endeavor to avoid local irritation, or systemic disturbance. Although we now know the bladder is a more forbearing organ than we were taught, I am still far from believing that we should, as a rule, resort to ether, and in the majority of cases strive to cure the patient at a single sitting by prolonged and complete crushing, followed by evacuation of the fragments. On the contrary, I think that as a general rule the vast majority of individuals for whom crushing is the proper operation can be relieved with less danger by prolonging the operation over a number of sittings and doing but a small amount of work each time. Anyone who has studied lithotrity as an operation and practiced it as an art, is well aware that one

skilled in passing a lithotrite, can introduce an instrument and do a certain amount of crushing without subjecting the patient to any more disturbance than usually succeeds an ordinary paroxysm of straining such as in calculous patients follow almost every attempt to void the urine. Again, in many cases, the central nucleus is the only part of the stone that is hard; the layers which envelope it are phosphatic in character and do not break up into sharp angular fragments. In numerous instances this hard central nucleus can gradually be divested of its coatings, and these external layers granulated by the lithotrite and voided with the urine; numerous sittings may be required, and the operation prolonged over weeks or months; but the stone is steadily reduced in size, and finally the hard central part is broken up, its fragments pulverized and the debris evacuated without a single thing occurring to render the employment of an anæsthetic necessary. Inasmuch as preliminary treatment can do so much to render lithotrity safe and painless, I cannot but think that in the majority of cases lithotritists will still cling to the traditions of Civeale and hold to the doctrine that the true principle for their guidance is to effect the maximum of work with the minimum of disturbance, always striving to destroy as much of the stone as possible without either leaving sharp, angular fragments to irritate the bladder, or producing vesical disturbance by the length of time they permit their instruments to remain in the urinary passages.

In certain of these cases the lithotritist may grasp the stone with the fenestrated instrument, and, as he subjects it to the teeth of that lithotrite, find that the external layers have given way, permitting the calculus to slide out of his grasp. He may at once remove the instrument, place his patient in the recumbent posture with counter-irritation—such as camphorated stupes—over the bladder. Two days afterwards he may pass a non-fenestrated instrument and granulate a quantity of rough, irregular, but soft phosphatic material. If he grasp the stone he finds it but half its former size; he may even dislodge more phosphatic matter by this very maneuver. Finally, after thus removing the soft coating of the hard center, the time comes for the destruction of the latter. Imagine this round, hard central portion to be either of uric acid or oxalate of lime; that it requires considerable force to break it; and that after fracturing it, the pieces are each broken into several fragments, the lithotrite removed and the patient placed flat on his back with strict injunctions not to deviate from that position, especially when urinating. All goes well for ten or twelve hours; then the patient has a chill, fever, furred tongue and great pain in the bladder — what is to be done? Now it is true that similar symptoms may succeed the passage of a catheter; yet when they develope after a sitting that has left a quantity of sharp fragments in the bladder they are very alarming. This is one of the situations in which

Bigelow's aspirator and urethral canulæ are invaluable: pass a straight canula, inject a few ounces — not more than two — of warm water after permitting the bladder to discharge what urine it may contain (which sometimes presents significant traces of blood) and connect the canula with the aspirator. With great gentleness and care evacuate what fragments you can. Should some still remain, pass a non-fenestrated lithotrite granulate the fragments you come in contact with, then evacuate the debris, making sure you remove the whole. There is no objection to the use of ether, although it is better to get along without it when you can.

Again: Suppose the stone you have to remove is one composed of oxalate of time. Here you will have very hard and very sharp fragments. In such a case, lithotrity at a single sitting might be a desirable measure. In cases complicated by stricture of the urethra or organic disease of the bladder, the operator may, at any moment be compelled to resort to evacuation in order to set the bladder instantly at rest. In fact, the power this apparatus gives the surgeon over the contents of the bladder—enabling him at any moment to empty that viscus — constitutes one important advantage. Not only in cases where these complications exist does this method prove valuable, but also in cases where accidents have occured. Thus, retention, hæmorrhage, inflammation of distant organs, cystitis, orchitis, epididymitis, etc., may compel the surgeon to resort to it.

The limited time at my disposal has compelled me to omit many things I would have been pleased to dwell upon. It would have been interesting to trace the manner in which this method of evacuating fragments—of emptying the bladder of debris — first came into existence. An Irish surgeon — Sir Phillip Crampton — first devised an evacuating apparatus. An English surgeon, Mr. Clover, modified it, and improved it—nevertheless, the idea is essentially the same as the one that animated Crampton. Prof. Dettell subsequently devised a Syphon-Suction Evacuating Apparatus that had its day. Professor Bigelow finally constructed the appliance I now exhibit—one admirably adapted to accomplish the end the surgeon has in view, and one that will doubtless remain in use for some time to come.